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Shaw™
Shaw E & I, Inc.

Geotechnical Laboratory
PO Box 4339
1570 Bear Creek Road
Oak Ridge TN 37830
(865) 482-6497

CERTIFICATE OF ANALYSIS

Stephen Trent
Fluor Hanford, Inc.
825 Jadwin Avenue
Richland, Washington 99352

January 27, 2005

This is the Certificate of Analysis for the following samples:

Shaw Project ID:	**Eberline - Hanford**
Shaw Project Number:	**100846.44000000**
Client Sample Data Group:	H2895
Date Received by Lab:	December 15, 2004
Number of Samples:	One (2)
Sample Type:	Soil

I. Introduction/Case Narrative

Two soil samples were received by the Shaw Geotechnical Laboratory on December 15, 2004. The samples were submitted for determination of bulk density, sieve analysis, hydraulic conductivity, specific gravity, and calcium carbonate content. The sample numbers received was B1BR57 and B1BR58.

Please see Appendix A, Sample Number Cross Reference List; Appendix B, Analysis Results; and Appendix C, Chain-of-Custody/Sample Receipt Records.

"I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature."

Reviewed and Approved:

Ralph Cole
Laboratory Manager, Geotechnical Services

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II. Analytical Results/Methodology

REFERENCES: United States Army Corps of Engineers (USACE), Engineer Manual 1110-2-1906, *Laboratory Soils Testing*, appendix II, 1970; United States Environmental Protection Agency, SW846, *Test Methods for Examining Solid Waste, Physical/Chemical Methods*, 3rd ed., Nov 1986 (EPA SW-846). Annual Book of ASTM Standards, Section 4, Construction, Volume 04.08, *Soil and Rock (I)*, and Volume 04.09, *Soil and Rock (II)*, 2004. Shaw Environmental and infrastructure, Standard Operating Procedures.

Moisture Content of Soil and Rock..... **ASTM D 2216**
Bulk Density of Soils..... **EM 1110-2-1906**
Particle-size Analysis of Soils..... **ASTM D 422**
Hydraulic Conductivity of Porous Materials Using
a Flexible Wall Permeameter..... **ASTM D 5084**
Specific Gravity of Soil..... **ASTM D 854**
Calcium Carbonate Content..... **ASTM D 4373**

III. Quality Control

Quality control checks such as duplicates and spikes (QC samples), are not normally applicable to geotechnical testing. This is due largely to the inability of obtaining samples with known characteristics, the heterogenous nature of the samples, and quality control procedures built-in to the analytical method.

QC measures to ensure accuracy and precision of test results include the following:

- 100% verification of all numerical results - raw data entries, transcriptions and calculations entered by lab technicians are checked, recalculated and verified. Most data calculations are performed by computer programs.

- Data validation through test reasonableness - summaries of all test results for individual reports are reviewed to determine the overall reasonableness of data and to determine the presence of any data that may be considered outliers.

- Quality control procedures are built into most standardized geotechnical procedures. For example, liquid limit and plastic limit analyses call for re-analyses and specify acceptance criteria.

- Routine instrument calibration - instruments, gauges and equipment used in testing are calibrated on a routine basis. All instrument calibration follows ASTM or manufacturer guidelines.

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- Maintenance of all past calibration records - calibration records and certification documents of all instruments, gauges and equipment are updated routinely and maintained in the Quality Control Coordinators Quality/Operations files.

- Certified and trained personnel - all technicians are certified by the National Institute for Certification of Engineering Technicians (NICET) in geotechnical soil testing, and are trained in the application of standard laboratory procedures for geotechnical analyses as well as the quality assurance measures implemented by Shaw.

- Quantitative analyses frequently used in geotechnical/physical testing programs do not use QC tools common to wet chemistry or radiochemistry laboratories. Measures not employed in the analysis of samples reported in this report include: laboratory control samples (LCS), blanks, matrix spikes (MS), duplicate analyses, dilutions, digestions, correction factors, surrogate sample analyses, detection limit determinations, control charts, and/or tentatively identified compounds (TICs).

IV. Data Qualification

None.

Appendix A
Sample Cross-Reference List

January 27, 2005
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Shaw Project Name: Eberline Hanford
Shaw Project No. 100846.44000000
SDG No. H2895

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SAMPLE NUMBER CROSS-REFERENCE LIST

LAB SAMPLE NO.	CLIENT SAMPLE NO.	MATRIX
BC0496	B1BR57	Soil
BC0497	B1BR58	Soil

Appendix B
Sample Test Results

January 27, 2005
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BULK DENSITY/DRY DENSITY
EM-1110-2-1906, APPENDIX II

PROJECT NAME: **Eberline - Hanford**

PROJECT NUMBER: **100846.44000000**

LAB SAMPLE NUMBER	CLIENT SAMPLE NUMBER	AVERAGE LENGTH, inches	AVERAGE DIAMETER, inches	WET WEIGHT, grams	MOISTURE CONTENT, %	BULK DENSITY, pcf	DRY DENSITY, pcf
BC0496	B1BR57	5.0349	3.8648	2217.15	10.7	143.0	129.2
BC0497	B1BR58	5.1713	3.8662	2401.12	9.2	150.7	138.0

Moisture content calculated by ASTM D 2216 based on sample dry weight.
Bulk density is the weight of wet sample divided by the volume of the wet sample (as-received).
Dry density is the weight of the dry sample solids divided by the volume of the original sample.

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PARTICLE-SIZE DISTRIBUTION
ASTM D 422

Project Name Eberline Hanford

Project No. 100846.44000000

Field Sample No. B1BR57

Lab Sample No. BC0496

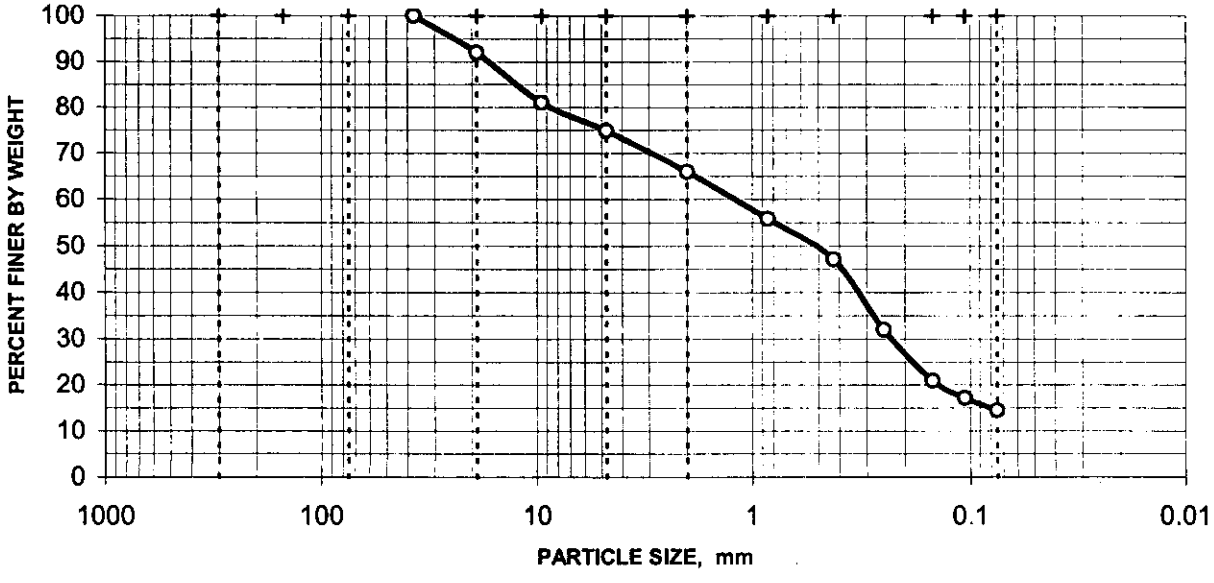
Moisture Content = 10.7%
based on dry sample weight

SIEVE ANALYSIS

	Sieve No.	Diameter mm	Percent Finer
COARSE	3"	75.000	100.0%
	1.5"	37.500	100.0%
	0.75"	19.000	91.9%
	0.375"	9.500	81.0%
	#4	4.750	74.9%
	#10	2.000	65.9%

	Sieve No.	Diameter mm	Percent Finer
FINE	#20	0.850	55.8%
	#40	0.425	47.1%
	#60	0.250	32.0%
	#100	0.149	20.9%
	#140	0.106	17.1%
	#200	0.075	14.5%

DISTRIBUTION CURVE



25.1% Gravel 60.4% Sand 14.5% Silt/Clay

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PARTICLE-SIZE DISTRIBUTION
ASTM D 422

Project Name Eberline Hanford

Project No. 100846.44000000

Field Sample No. B1BR58

Lab Sample No. BC0497

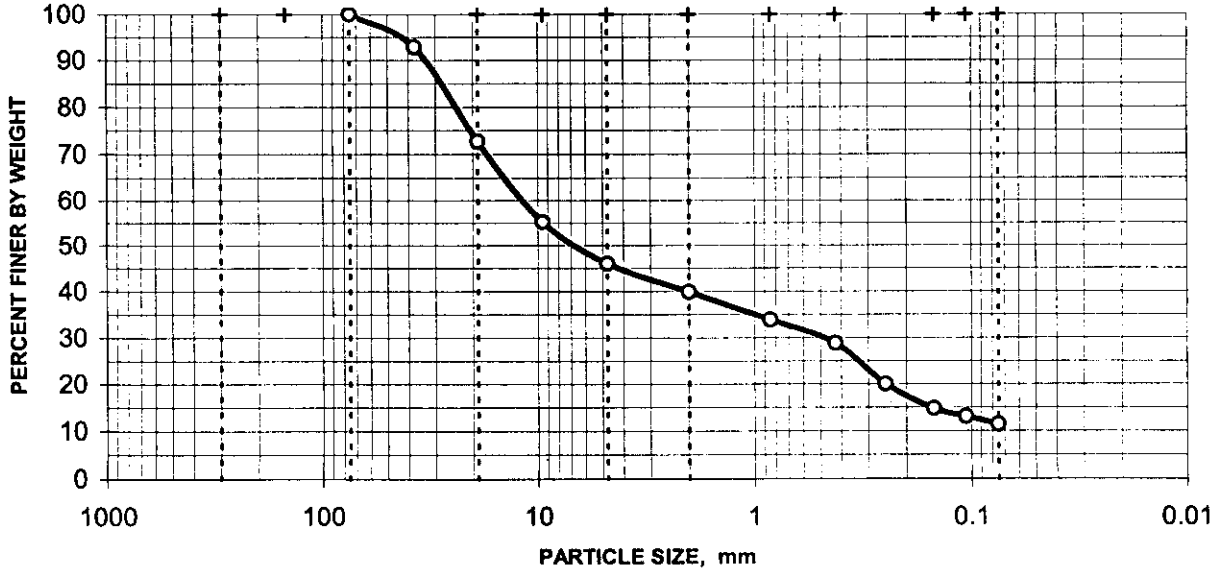
Moisture Content = 9.2%
based on dry sample weight

SIEVE ANALYSIS

	Sieve No.	Diameter mm	Percent Finer
COARSE	3"	75.000	100.0%
	1.5"	37.500	92.9%
	0.75"	19.000	72.7%
	0.375"	9.500	55.2%
	#4	4.750	46.0%
	#10	2.000	39.9%

	Sieve No.	Diameter mm	Percent Finer
FINE	#20	0.850	33.8%
	#40	0.425	28.9%
	#60	0.250	20.0%
	#100	0.149	14.7%
	#140	0.106	13.0%
	#200	0.075	11.4%

DISTRIBUTION CURVE



54.0% Gravel 34.6% Sand 11.4% Silt/Clay

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HYDRAULIC CONDUCTIVITY / PERMEABILITY
ASTM D 5084

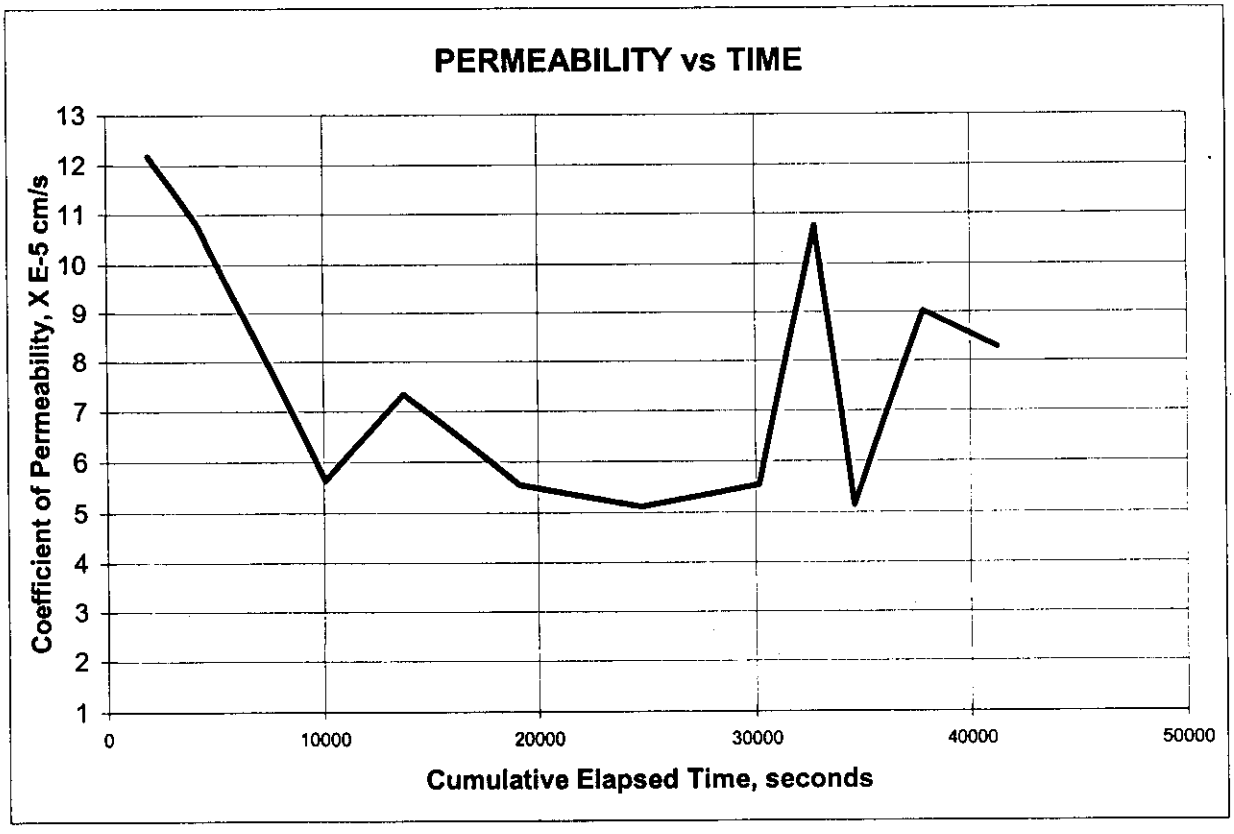
PROJECT NAME: Eberline Hanford
PROJECT NO. 100846.44000000

CLIENT SAMPLE NO. B1BR57
LAB SAMPLE NO. BC0496

	INITIAL	FINAL
Specimen diameter, cm	4.95	
Specimen length, cm	9.44	
Wet weight of specimen, g.	400.22	
Specimen cross-sect. area, cm^2	19.24	
Water content, %	11.8	
Wet unit weight, pcf	137.6	
Dry unit weight, pcf	123.1	
Degree of saturation, %	84.6	
Specific gravity of solids	2.72	

Hydraulic gradient	3.7
Min. consolidation stress, psi	2.0
Max. consolidation stress, psi	2.5
Total backpressure, psi	7.5
Permeant Fluid	Deaired DI Water

Coefficient of Permeability, cm/s 5.9E-05



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Shaw Project No. 100846.44000000
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HYDRAULIC CONDUCTIVITY / PERMEABILITY
ASTM D 5084

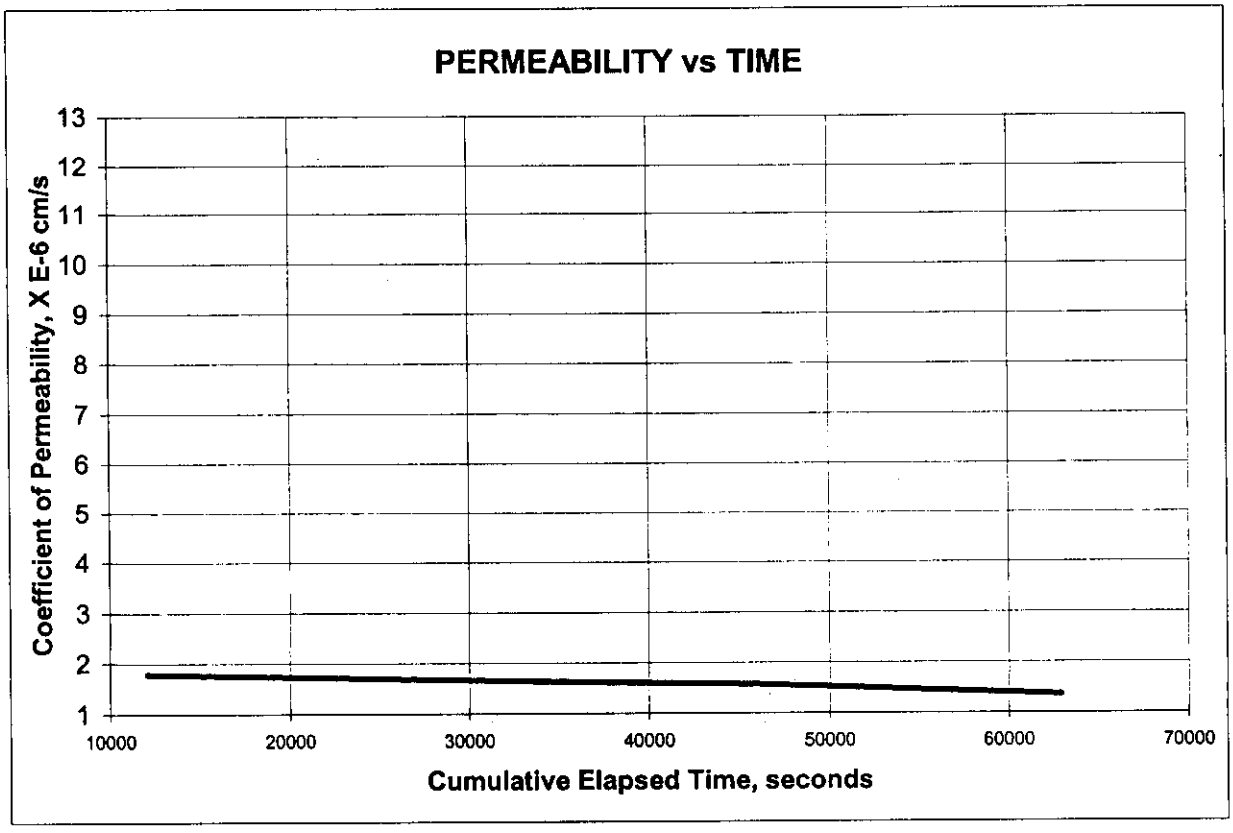
PROJECT NAME: Eberline Hanford
PROJECT NO. 100846.44000000

CLIENT SAMPLE NO. B1BR58
LAB SAMPLE NO. BC0497

	INITIAL	FINAL
Specimen diameter, cm	6.40	
Specimen length, cm	7.34	
Wet weight of specimen, g.	532.23	
Specimen cross-sect. area, cm^2	32.14	
Water content, %	15.2	
Wet unit weight, pcf	140.8	
Dry unit weight, pcf	122.3	
Degree of saturation, %	104.9	
Specific gravity of solids	2.73	

Hydraulic gradient	9.6
Min. consolidation stress, psi	2.0
Max. consolidation stress, psi	2.5
Total backpressure, psi	7.5
Permeant Fluid	Deaired DI Water

Coefficient of Permeability, cm/s 1.6E-06



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SPECIFIC GRAVITY ASTM D 854

PROJECT NAME:
Eberline Hanford

PROJECT NUMBER:
100846.44000000

LAB SAMPLE NO.	CLIENT SAMPLE NO.	SPECIFIC GRAVITY
BC0496	B1BR57	2.7171
BC0497	B1BR58	2.7334

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Carbonate Content of Soils ASTM D 4373

PROJECT NAME: **Eberline Hanford**

PROJECT NUMBER: **100846.44000000**

LAB SAMPLE NO.	CLIENT SAMPLE NO.	CO3, %
BC0496	B1BR57	0
BC0497	B1BR58	0

Appendix C
Chain-of-Custody and Request-for-Analysis Records

Fluor Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F04-033-025	PAGE 1 OF 1

COLLECTOR	COMPANY CONTACT	TELEPHONE NO.	PROJECT COORDINATOR	PRICE CODE 8N	DATA TURNAROUND
Alexander/Gent/Thomas	TRENT, SJ	373-5869	TRENT, SJ	AIR QUALITY ☐	45 Days / 45 Days
SAMPLING LOCATION	**PROJECT DESIGNATION**		**SAF NO.**		
200-ZP-1/C4301/~~285-290~~ ft 305-308 BT 12/9/04	200-ZP-1 Characterization Sampling and Analysis - Soil		F04-033		
ICE CHEST NO. GRP-03-016	**FIELD LOGBOOK NO.** HNF-N-314 2	**COA** 119325ES10	**METHOD OF SHIPMENT** Federal Express		
SHIPPED TO Shaw Group	**OFFSITE PROPERTY NO.** SuPTC 14572		**BILL OF LADING/AIR BILL NO.** SuPTC 14572		

MATRIX*
A=Air
DL=Drum Liquids
DS=Drum Solids
L=Liquid
O=Oil
S=Soil
SE=Sediment
T=Tissue
V=Vegitation
W=Water
WI=Wipe
X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS Rad to to B1BR63

SDG# H2895

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	None													
TYPE OF CONTAINER	Split Spoon Liner													
NO. OF CONTAINER(S)	2													
VOLUME	1000g													
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS													

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME											
B1BR57	SOIL	12/9/04	1420	X										

BC 0496

CHAIN OF POSSESSION

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Greg Thomas Dan Hinojosa	12/9/04 2200	Refrigerator #1 MO-026	12/9/04 2200
M.G. Bauchiu M.G. Bauchiu	12/13/04 0930	M.H. Bauchiu M.G. Bauchiu	12/13/04 0930
M.H. Bauchiu M.G. Bauchiu	12/13/04 0930	Fed Ex	
Fed Ex	12/14/04 9:30	[illegible]	12/14/04 9:45
Fred Swan	12/14/04	Fed Ex	12/14/04

SIGN/ PRINT NAMES

SPECIAL INSTRUCTIONS

(1)Bulk Density - D2937; Particle Size (Dry Sieve) - D422; Calcium Carbonate Content; Saturated Hydraulic Conductivity; Particle Density - D854;

To SHAW LAB

LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
	Don Hinkley	SHAW E+I SR. LAB TECH	12/15/04 0900
FINAL SAMPLE DISPOSITION	**DISPOSAL METHOD**	**DISPOSED BY**	**DATE/TIME**

A-6003-618(03/03)

5100000151

Fluor Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F04-033-026	PAGE 1 OF 1

COLLECTOR	COMPANY CONTACT	TELEPHONE NO.	PROJECT COORDINATOR	PRICE CODE 8N	DATA TURNAROUND
Alexander/Gent/Thomas	TRENT, SJ	373-5869	TRENT, SJ	AIR QUALITY ☐	45 Days / 45 Days
SAMPLING LOCATION	**PROJECT DESIGNATION**		**SAF NO.**		
200-ZP-1/C4301/330-335 ft	200-ZP-1 Characterization Sampling and Analysis - Soil		F04-033		
ICE CHEST NO. GRF-03-016	**FIELD LOGBOOK NO.**	**COA** 119325ES10	**METHOD OF SHIPMENT** Federal Express		
SHIPPED TO Shaw Group	**OFFSITE PROPERTY NO.** SUPTR 14572		**BILL OF LADING/AIR BILL NO.** SUPTR 14572		

MATRIX*
A=Air
DL=Drum Liquids
DS=Drum Solids
L=Liquid
O=Oil
S=Soil
SE=Sediment
T=Tissue
V=Vegitation
W=Water
WI=Wipe
X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS Rad to to B1BR13 SDG# H2895

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	None
TYPE OF CONTAINER	Split Spoon Liner
NO. OF CONTAINER(S)	2
VOLUME	1000g
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME		
B1BR58	SOIL	12/10/04	1310	X	

BC 0497

CHAIN OF POSSESSION / **SIGN/ PRINT NAMES**

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
PM GENT	12/10/04 1640	REFRIG FT	12/10/04 1640
M.G. Barnum	12/13/04 0930	M.G. Barnum	12/13/04 0930
M.G. Barnum	12/13/04 0930	Fed Ex	
Fed Ex	12/14/04 9:30	[illegible]	12/14/04 9:45
[illegible]	12/14/04	Fed Ex	12/14/04

SPECIAL INSTRUCTIONS

(1)Bulk Density - D2937; Particle Size (Dry Sieve) - D422; Calcium Carbonate Content; Saturated Hydraulic Conductivity; Particle Density - D854;

#3 - 3292g

#2 - 3215g

To SHAW LAB

LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
	[signature]	SHAW E+I SR. LAB TECH	12/15/04 0900
FINAL SAMPLE DISPOSITION	**DISPOSAL METHOD**	**DISPOSED BY**	**DATE/TIME**

A-6003-618(03/03)

SDG# H2895

PAGE 1 Eberline Srvces CHAIN OF CUSTODY ORD # R4-12-149

12/14/04 11:34:03 WORK ID: SAF# F04-033 SDG H2895

RCVD: 12/14/04 DUE: 01/28/05 KEEP: 01/28/06 DISP: S

DASH	SAMPLE IDENTIFICATION	STORED	TESTS
01A-S	B1BR57	SHAW	DISPOS E329S E331S E335S E342S E345S
02A-S	B1BR58	SHAW	DISPOS E329S E331S E335S E342S E345S

RELEASED BY	DATE	TRANSFERRED TO	DATE	RECEIVED BY	DATE
[signature]	12/14/04	TO SHAW LAB	12/14/04	[signature] SHAW LAB	12/15/04

BC 0496

BC 0497

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